POWER GENARATION USING RECIPROCATING SHAFT MECHANISM ATTACHED TO SPEED BUMPERS

[1]Prof.Kamble.P.S [2]Digvijay Gadkar, [2]Vishal Jadhav,[2]Swapnil Rahate, [2]Shubham Bansode, [2]Suhel Mulla

[1]Professor, [2]UG Students, Department of Electrical Engg. Jaywant College of Engineering & Polytechnic Killemachhindragad, Maharashtra, India.

ABSTRACT

Electricity is generated by replacing the usual speed breakers with some simple mechanism. As vehicles pass over the speed breakers, reciprocating shaft mechanism works and with the help of high-tension springs which in turn generate electricity. This method is an effective way to produce electricity as the number of vehicles is ever increasing. It can be effectively placed near toll plazas, parking lots and other locations where density of vehicles is very high. A reciprocating shaft mechanism & spring assembly mechanism is provided to transfer the motion to a DC motor/generator for electricity generation. This method provides a cost-effective way to generate electricity from the mechanical energy of dynamic vehicles on roads.

I INTRODUCTION

Now-a-days we require a lot of electric energy for our everyday task. Many renewable non-conventional energy systems and power plants are being used [1-3] in addition to the fossil fuel. Now it is possible while you are driving your car or riding any kind of two-wheeler [4]. This can be done when we drive or ride over a speed breaker. The conventional speed breakers are only used to reduce the speed of a vehicle which totally depends on the material with which the speed breakers are made. Sometimes these speed breakers are made of rubber, or concrete or sometimes mixture of concrete and pavements. This can be done by introducing some of simple mechanisms under the speed breakers. One such simple mechanism is a rack and pinion gear or reciprocating gear while the other one is a small generator with some wiring. With the help of these small mechanism, we can implement the power generation from the speed breakers.

II METHODOLOGY

In the case of power generation through speed breaker we can use multiple types of the generation methods or we can a method to translate power from linear motion to the rotational motion. By the principle of physics we can use reciprocating shaft in car or motor cycle to achieve the linear motion so we also get use of that in reverse manner . There are also a method of power generation with the help. Speed breaker power generation unit (SBPGU) is a method to trap waste energy at speed breaker.

The present projects use reciprocating shaft mechanism with a connection of intermediate gear mechanism which converts waste potential energy of a vehicle at speed breaker to a useful mechanical energy

III WORKING

Here we use reciprocating shaft arrangement in the site of the speed bumper. It will convert the liner motion to rotational motion. We have a speed breaker arrangement just like usual one , but it moves downwards when it will get pressed and we can have attached the reciprocating shaft arrangement to it and that reciprocating shaft get moving when it is l pushed by linear motion and car weight so we have attached the small and big wheel or gear arrangement for further operation to be done. When the reciprocating shaft converts the energy into circular type then the gear arrangement gets moved and it will get the speed of required rpm for power generator. Power generator is then connected to the gear arrangement with low rpm but high output values of current and voltage. When the generator becomes operational the power generated is stored inside the battery which is connected to the generators .The stored energy can be used for further use.
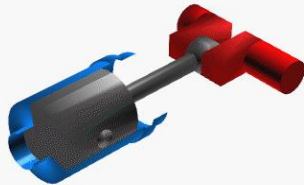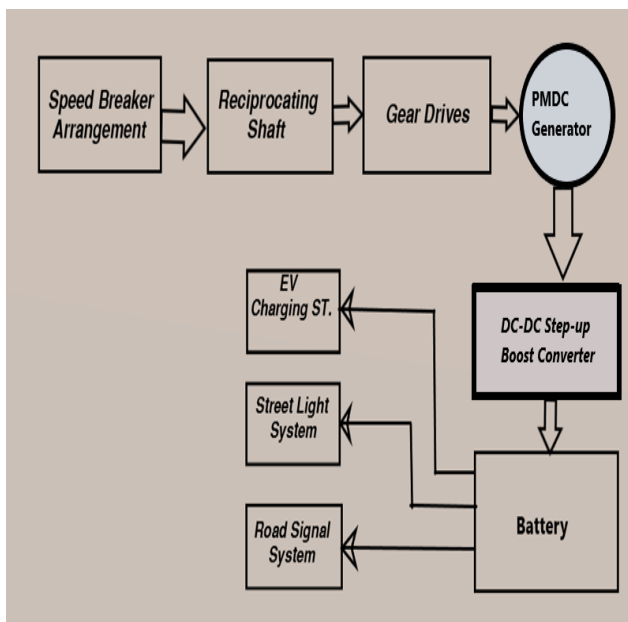
Fig.1 Reciprocating Pump

Fig.2 Block diagram of Power generation system

IV PARTS TO BE USED

1)Speed Breaker Arrangement

This is a normally used one available everywhere. This breaker can be made from the composite of carbon fibre and   rubber so that the speed breaker can sustain the heavy load of vehicles such as a container filled with some Material in it. In the present work we have used the speed breaker with rubber material but sturdy also which can sustain big pressure on it.

2)Reciprocating Shaft

The reciprocating   pump   works on   the principle of positive displacement. A reciprocating piston pump consists of a piston that moves back and forth in a cylinder. The piston is connected with a crankshaft with the help of a connecting Rod. This piston moves as the connecting rod move due to the motion of the crankshaft as shown in fig.1. The crankshaft connects motor that rotates it.

3)Gear Drive

The Gear drives is the most common unit with one small and one big gear which is driven by the axil connected to the reciprocating shaft , and it will be usefull for our generation . This is because of the fact that our generation is low rpm based generation and it will boost the rpm of the axil.

4)PMDC Generator

As the name suggest the pmdc generator is permanent magnet generator which is used for generation of power by converting mechanical into electrical energy. Here we have used low rpm generator with 2400 base rpm but with coupled with gear.

5)DC TO DC STEP UP BOOSTER

It is used for step up the input voltage and giving the respectively high voltage than input in dc form.

6)INVERTOR(BATTERY)

The Invertor is device which used to convert DC to AC and store it to battery connected to that invertor. Here we are using lithium ion battery with high capacity.

V LOAD TO BE CONNECTED

i. **Street Light-**   Here we used our generated power for street light with LED bulbs.
ii. **Traffic Signal Light-** Our power can be used for traffic signal in city for rush areas.
iii. **EV Charging Station:** we can implement this system for EV stations. When it is placed near toll plazas , the Electrical vehicles can get charged here.

_____ ___

VI CALCULATION

Mass of a regular car = 1600kg (Avg.)

Weight of car = Mass * Acceleration due to gravity = 1600kg * 9.8ms-2 = 15680N

Height of Speed Breaker = 15cm

Work done = Force * Displacement = Weight of car Height of Speed Breaker = 15680N * 0.15m = 2352Nm

Power = Work done / time = 2352Nm / 60s = 39.2W

Power generated in a day = 39.2W * 24hr * 60 min = 56.45 KW

VII CONCLUSION

As we all know, now days availability of power is very low and hence for huge world's population it is essential to look for easily available non-conventional energy resources. Hence our attempt to produce power from speed bumpers will be an alternate to fossil fuels. Hence to be able to control this need of electricity consumption and reduce the use of other fossil fuels. This project, if implemented into everyday life energy can be produced with low maintenance and zero emission.

REFERANCES

[1]. Sharma P.C Principle of renewable energy systems ,Public printing service, New Delhi,(2003)

[2]. Sharma.P.C, Non-Conventional power plants ,Public printing service, New Delhi, (2003).

[3]. Mukherjee.D.Chakrabarti.S. Non-conventional power plants ,Public printing service, New Delhi, (2005).

[4]. Ankita, MeenuBala, Power Generation From Speed Breakers, International Journal Of Advance Research In Science and Engineering,2(2),2013.pp-1-5